



The Open
University

M140

Introducing statistics

Accessibility Guide

This publication forms part of an Open University module. Details of this and other Open University modules can be obtained from Student Recruitment, The Open University, PO Box 197, Milton Keynes MK7 6BJ, United Kingdom (tel. +44 (0)300 303 5303; email general-enquiries@open.ac.uk).

Alternatively, you may visit the Open University website at www.open.ac.uk where you can learn more about the wide range of modules and packs offered at all levels by The Open University.

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First published 2013. Second edition 2016. Third edition 2017.

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Edited, designed and typeset by The Open University, using the Open University T_EX System.

Printed and bound in the United Kingdom by Page Bros Group Ltd.

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Introduction

This Accessibility Guide describes accessibility issues that relate to M140 *Introducing statistics*.

The Open University (OU) provides a range of support services for students with additional needs. Information on the services that are available can be found on the ‘Disabled student support’ website at www.open.ac.uk/disability, which can also be accessed via your StudentHome page. This site contains a four-step checklist to help you decide what type of support you may need, as well as giving information on different learning needs. You can submit a form outlining your requirements and then discuss the help you need with an adviser. For example, you may find it helpful to have module materials in an alternative format, to have extra tutorial support or to have flexibility with some assignment deadlines. Any sensitive information will be treated confidentially.

If you live in the UK, then you may be able to get a public grant called the Disabled Students’ Allowance (DSA). This aims to cover the extra costs of studying in higher education: for example, the need for specialist equipment that might arise because of your disability, medical condition or specific learning difficulty. Further information on the DSA is available on the ‘Disabled student support’ website and in the Help Centre on your StudentHome page.

You can also obtain advice and information from your national or regional centre.

If you have not already contacted us about any additional requirements you may have, please get in touch as soon as possible to discuss these, as some support services can take several months to arrange.

This guide outlines some of the general accessibility issues that apply to distance learning of statistics, as well as some specific points about M140. Many of the issues discussed apply to both mathematics and statistics, and you can assume that references to mathematics also apply to statistics. This guide includes:

- tips, techniques and links to free software for improving accessibility
- advice on writing mathematics and statistics
- advice on assessment.

General information about online accessibility is available from the ‘Disabled student support’ website.

1 Studying M140

Similarly to other mathematics or statistics modules, M140 uses a wide range of resources. These include the following:

- a module website
- printed study material
- a scientific calculator
- online interactive computer resources
- statistical computer software (Minitab)
- screencasts (short audio-visual presentations).

In addition, you will have the opportunity to join in discussions with your tutor and other students, in tutorials and through online forums and email. The tutorials may take place at a study centre or using the University's online rooms, which includes audio, text and images.

By its nature, statistics is a very visual subject. M140 contains a considerable number of graphs and diagrams that you will need to be able to interpret and produce, as well as a certain amount of mathematical notation. If you have difficulties reading print (due to a visual impairment or other learning difficulty, such as dyslexia) or have limited manual dexterity, you may experience difficulties with some of the activities and assessment questions that involve using your computer, or that have a high level of graphical content.

The M140 module team has tried to avoid using inaccessible resources and to provide accessible alternatives where possible. However, some material that is core to the module may not be easily accessible, even if you use assistive technology. In these instances, you may need a non-medical helper to assist you.

1.1 The M140 website

The M140 website provides access to a range of resources. These include the study planner, module resources, online interactive computer resources, and assessment materials. The website has been checked for accessibility and has an 'Accessibility' link at the top of each page. This provides advice on increasing the text size and changing your browser settings, such as colours and fonts. It also includes some useful external links.

Written figure descriptions for the diagrams and images in the module material can be found on the website, as well as subtitled screencasts and written transcripts.

Searchable PDF versions of printed material are available on the website. However, mathematical and statistical content in PDF files is unlikely to be accessible using a screenreader. You may need to rely on additional help to read these documents.

1.2 Mathematics on web pages

Some of the mathematics contained within the M140 website (for example, within the iCMA, iCME and practice quiz questions) may have been created using MathML, the World Wide Web Consortium standard for mathematics on the web. By default, the University's system displays this mathematics as images with white backgrounds. If you wish to change the size or colour of these images, then click on one of them and you will be taken to a page providing detailed information about that particular equation. You will see options to change the size and colour of the images presented. Choose your preferred settings and save your changes. You can then return to your original page by clicking the link to take you back, and your image settings will remain until another change is made.

Alternatively, you can select to have the mathematics displayed as MathML directly. This is supported by the Firefox web browser with appropriate fonts, or by Internet Explorer with the MathPlayer plug-in installed.

- The Firefox fonts can be downloaded from www.mozilla.org/projects/mathml/fonts.
- The Internet Explorer plug-in can be obtained free of charge from www.dessci.com/en/products/mathplayer/download.htm.

One advantage of displaying MathML directly is that the size and colour of the mathematics shown on pages will follow exactly any changes made to your preferred size and colour of text. In addition, when using Internet Explorer with the MathPlayer plug-in, mathematics displayed as MathML can be read aloud by the JAWS screenreader.

To switch to displaying mathematics as MathML rather than as images, click on any image of mathematics to get to the page showing the equation details, and tick the 'Show equations as MathML instead of images' box. Once this has been activated, a link will be displayed at the bottom of every page that contains MathML, enabling you to return to the image display option.

1.3 Printed study material

As well as the printed learning materials that you are sent, the M140 website provides alternative versions.

Text descriptions are provided for all printed diagrams, charts and graphs that require them. In some cases, you may find it helpful to use the PDF file provided, and enlarge the diagram or graph on your computer screen. An audio graphing calculator can also be used for some activities.

If you have a visual impairment and also have sighted help available to get you started, you might like to consider using (free) software such as MathTrax that can provide an audio version of some graphs and datasets and can be used alongside a screenreader. Tactile versions of some of the diagrams are also available and can be provided on request. If you think that you will need to make use of these you should discuss this with your Student Support Team (SST).

- MathTrax can be downloaded free from <http://prime.jsc.nasa.gov/mathtrax/homepage.htm>.
- Some notes on using MathTrax for plotting datasets are available at <http://prime.jsc.nasa.gov/mathtrax/SHOWME/data.htm> and for graphing equations at <http://prime.jsc.nasa.gov/mathtrax/SHOWME/equations.htm>.
- Further information on MathTrax is available at <http://prime.jsc.nasa.gov/mathtrax/INFO/documents.htm>.

If your disability makes it difficult for you to produce written mathematics, graphs or diagrams, you may like to consider using Efofex software. This is available free to disabled students under the EmPower programme. Further details are available at www.efofex.com/empower.php or by emailing info@efofex.com for further information.

1.4 Scientific calculators

You will need a scientific calculator for M140. Any model that meets the specification described in the M140 Guide can be used, including computer-based calculators, talking calculators or those with large keys and displays. You can request the loan of a talking scientific calculator from the ‘Disabled student support’ website. You can also use the Windows calculator if you wish. The menu contains an option to switch the calculator to scientific mode.

1.5 Computer resources

All the M140 computer resources, including the Minitab software, have been checked for accessibility and can be operated using the keyboard as well as the mouse. For some of the interactive computer resources and for some uses of Minitab, you may wish to consider the services of a non-medical helper, even if you have assistive technology.

1.6 Screencasts

Transcripts and subtitles of all the M140 screencasts are provided on the module website.

1.7 Experiment in Unit 10

When studying Unit 10 of M140, students are asked to perform an experiment using mustard seeds. You may find this difficult if you have limited dexterity. Data from the experiment are used in one of the assignments. If you are unable to collect your own data because of a disability, an alternative way of doing this assignment will be provided. For details of this, see the M140 website.

1.8 Tutorials

Some tutorials may be offered face-to-face, and some may take place on the internet using the OU online rooms. Please discuss with your SST and your tutor any particular requirements that you may have. More details of the system for online tutorials are given in Subsection 2.7 of the M140 Guide; you may wish to check whether you will require any special arrangements.

2 Writing your assignments using a computer or tablet PC

This section is aimed at those of you who either need to, or wish to, use a computer or tablet PC to prepare your assignments.

The main aspect of M140 assignments that may make them harder to produce on a computer or tablet PC is the mathematical notation. Compared to most modules in mathematics and statistics, M140 assignments do not contain a lot of mathematical notation – but there is *some*.

Typesetting or word-processing mathematics is a time-consuming process, but learning how to do it may be a good investment if you are intending to study modules involving a lot of mathematics. Typesetting mathematics, even the limited amount in M140 assignments, can be tricky. There are specific issues if you are a screenreader user: although you may be able to type in the maths expressions, these may not be able to be read back to you. The essential reason why typesetting mathematics is difficult is that written mathematics is two-dimensional in nature. Objects like fractions have a two-dimensional format and are sometimes stored as images rather than text. This is why screenreaders have difficulty. The good news is that technology is improving all the time and there is software that can help you.

L^AT_EX

If you use a screenreader and intend to study mathematics and statistics beyond Stage 1, then you are advised to learn how to use L^AT_EX, a freely available mathematical typesetting package. This system is long established and it is used by professional mathematicians and statisticians. Mathematical expressions can be typed in a straightforward way, and experienced visually impaired users are likely to read mathematics, as well as write it, in this format. There is further information about Braille and L^AT_EX at <http://latex-access.sourceforge.net>.

MathType

If you are studying M140 as part of another subject area, where Microsoft Word (or similar) is the normal document software, we currently suggest that you use software called MathType. You can find out about this software at www.dessci.com/en/products/mathtype.

If you obtain version 6.5 or higher of MathType, then you will be able to type in your mathematics using L^AT_EX notation, but manage the rest of the document in the usual way. You can then toggle between the L^AT_EX and the maths display by pressing **Alt** and **** (the backslash key) together. This should help with checking your work. There are some further details at www.access2science.com/jagqn/WordLatex.html.

If you decide to use MathType for your assignments and discussions with your tutor, please check that they can see what you have written. If they do not have MathType installed, then they may not be able to see your mathematical statements. One option is to convert your document into a PDF so that your tutor can read it easily. This is a reliable method and is recommended.

3 Assessment

The assessment on M140 is in the form of tutor-marked assignments (TMAs), interactive computer-marked assignments (iCMAs), and an end-of-module assessment (EMA). The EMA consists of a final iCME (which works in a similar way to an iCMA) and a written assignment ('written EMA').

The TMA and written EMA questions are provided in PDF format on the M140 website. In places where graphs or diagrams are used, descriptions will be supplied. You should be able to complete the TMAs successfully with appropriate support from your tutor or helper.

The iCMAs and the final iCME are submitted online and may have some interactive content.

If you are registered with the University as having a disability that will prevent you submitting iCME 81 online, you can request a printed copy by emailing: STEM-MS-Teaching-Quals@open.ac.uk. Please provide your name and student number (personal identifier, or PI) in all correspondence.

If you are unable to submit all your assignments or have extra difficulties while working on the EMA, you are advised to report this to the M140 Examination and Assessment Board, so that it can be taken into account when determining your module result. Information on how to make such a report is given on StudentHome.

If you need further help with the assessment on your module, please contact your tutor.

4 Web links and further information

The list below summarises the main websites mentioned in this guide; you can access the university links from your StudentHome page. If any of these web links change, updates will be given on the M140 website.

Description	Web address
Services for disabled students	www.open.ac.uk/disability
Firefox MathML fonts	www.mozilla.org/projects/mathml/fonts
MathPlayer	www.dessci.com/en/products/mathplayer/download.htm
MathTrax	http://prime.jsc.nasa.gov/mathtrax/homepage.htm
Using MathTrax to plot datasets	http://prime.jsc.nasa.gov/mathtrax/SHOWME/data.htm
Using MathTrax to draw graphs	http://prime.jsc.nasa.gov/mathtrax/SHOWME/equations.htm
EmPower programme	www.efofex.com/empower.php
L ^A T _E X–Braille converter	http://latex-access.sourceforge.net
MathType	www.dessci.com/en/products/mathtype
Using L ^A T _E X with MathType	www.access2science.com/jagqn/WordLatex.html

Further information

Microsoft has some useful pages on how to access computers at www.microsoft.com/enable/guides/default.aspx.

There is some information on keyboard and Windows shortcuts at <http://windows.microsoft.com/en-gb/windows/personalization-accessibility-help>.

For Apple computers, similar information is available at www.apple.com/accessibility.

If you do experience any difficulties during your studies, please contact your tutor – they will be able to help you with assistance from other OU staff in learning support and services for disabled students.